

AD/RHIC-AP-84

ν -Spread Due To Random Field Multipoles

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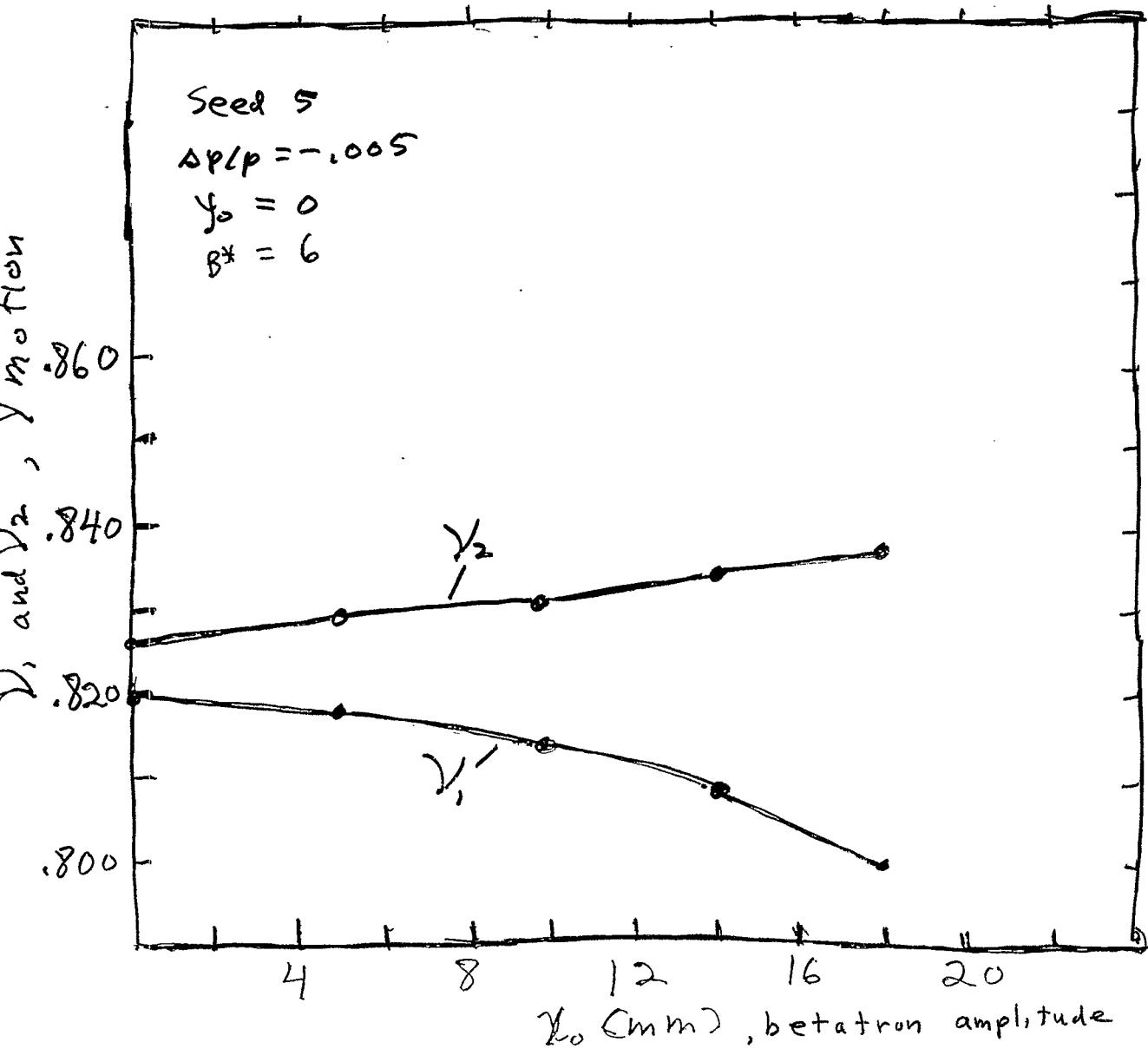
I. Introduction

Random a_k, b_k can produce an appreciable Δv spread (AD/RHIC-AP-52, 1987)
Largest Δv occurs when $\epsilon_y = 0$.

x and y motion contains 2 γ -values, γ_1 and γ_2 similar to linear coupling. In this case, the shift in the γ -values depends on E_x (assuming $\epsilon_y = 0$).

The $|\gamma_1 - \gamma_2|$ found for the largest E_x is a v -spread, since smaller $|\gamma_1 - \gamma_2|$ will be found for smaller E_x .

γ -shift due to Random Error Multipoles



(3)

2. ΔV spread due to random b_K, q_K

Random Error Distribution No.	Total $\Delta V/10^{-3}$ $\Delta V = V_1 - V_2 $	$\Delta V/10^{-3}$ due to Random b_K, q_K
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1	10	4
2	11	5
3	7	1
4	6	0
5	17	11
6	8	2
7	10	4
8	11	5
9	8	2
10	8	2

$$B^* = 6, \quad X_0 = 9.8 \text{ mm}, \quad Y_0 = 0, \quad \varepsilon_t = 1.92, \quad \gamma = 30^\circ, \quad \frac{\partial p}{p} = \pm 0.005$$

When $b_K = q_K = 0$, $V_x = .826$ $V_y = .820$, at $\Delta p/p = \pm 0.005$

ΔV due to random b_K, q_K equals Total $\Delta V - 6 \times 10^{-3}$.

ΔV , break down

ΔV spread appears due to

a_2, b_2, a_3, b_3 and a_4, b_4 .

Some correction of ΔV appears possible

$$a_K = b_K = 0, K \geq 5 \quad , \quad \Delta V_T = 16 \quad , \quad \Delta V_{\text{ran}} = 10$$

$$a_K = b_K = 0, K \leq 4 \quad , \quad \Delta V_T = 6 \quad , \quad \Delta V_{\text{ran}} = 0$$

Sources of ΔV

a_2, b_2 only

$$\Delta V_T = 9 \quad , \quad \Delta V_{\text{ran}} = 3$$

a_3, b_3 only

$$\Delta V_T = 12 \quad , \quad \Delta V_{\text{ran}} = 6$$

a_4, b_4 only

$$\Delta V_T = 8 \quad , \quad \Delta V_{\text{ran}} = 2$$

Correctability of ΔV

$$a_3 = b_3 = 0, \text{ all other } b_K, a_K \text{ present}, \quad \Delta V_T = 11 \quad , \quad \Delta V_{\text{ran}} = 5$$

$$b_2 = b_3 = b_4 = 0, \quad " \quad , \quad \Delta V_T = 9 \quad , \quad \Delta V_{\text{ran}} = 3$$

The reduction in ΔV of about 8 in this case seems surprisingly large. It might be safer to assume a possible reduction of about 5.